



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/839,044	04/20/2001	Katherine H. Cornog	A01004	3631

26643 7590 10/20/2004

PETER J. GORDON, PATENT COUNSEL
AVID TECHNOLOGY, INC.
ONE PARK WEST
TEWKSBURY, MA 01876

EXAMINER

EDWARDS, PATRICK L

ART UNIT PAPER NUMBER

2621

DATE MAILED: 10/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/839,044

Applicant(s)

CORNOG ET AL.

Examiner

Patrick L Edwards

Art Unit

2621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 July 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of: _____
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 10-07-2004.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. The response received on July 6, 2004, has been placed in the file and was considered by the examiner. An action on the merits follows.

Response to Arguments

2. The applicant's arguments, filed on July 6, 2004, have been fully considered. A response to these arguments is provided below.

Drawing and Specification Objections

Summary of Argument: Applicant submitted corrected drawings and amended the specification.

Examiner's Response: The drawing and specification objections are hereby withdrawn.

37 CFR 1.75 Claim Objections

Summary of Argument: Applicant has amended the claims and argues that these amendments obviate the prior claim objections

Examiner's Response: The examiner agrees. The claim objections are hereby withdrawn.

Prior Art Rejections

Summary of Argument: Applicant argues that the pair of edge images 'Sh' and 'Sv' disclosed in the 'Go' reference are not single channel images. Specifically, applicant recites that "This pair of edge images is essentially a two channel image" (see page 7 of applicant's remarks).

Examiner's Response: Applicant's arguments have been fully considered, but are not persuasive. The edge images 'Sh' and 'Sv' disclosed in the Go reference are indeed single channel images, because each pixel is represented by one value (see col. 7 lines 20-22 and 64 of the 'Go' reference, in conjunction with page 6 of the applicant's remarks).

Summary of Argument: Applicant additionally argues that the motion estimation in the 'Go' reference utilizes "block-matching" and therefore is not "gradient-based" (see page 7 of applicant's remarks).

Examiner's Response: Applicant's arguments have been fully considered, but are not persuasive. The examiner agrees that the motion estimation method disclosed in the 'Go' reference utilizes block matching. This is recited at col. 17 line 63 – col. 18 line 16 of the 'Go' reference. The examiner would like to make note of the fact that a motion estimation method can be both "correlation based" (see applicant's remarks page 7) and "gradient-based". These two motion estimation methods are not mutually exclusive. For instance, the 'Go' reference discloses that the block-based (or correlation-based) motion estimator 67 (see above cited passage) determines differences between pixel values. Thus, this method is gradient-based, by definition.

Art Unit: 2621

Summary of Argument: Applicant additionally argues that the motion estimation disclosed in the 'Go' reference is not based on a "constraint that a total of the desired characteristic is constant from one image to a next image" (see page 7 of applicant's remarks).

Examiner's Response: The examiner agrees that this limitation is not expressly recited in the 'Go' reference. However, this additional limitation does not place the claims in condition for allowability over the prior art. This limitation is commonly used in the art, and is employed in motion estimation techniques that utilize an "optical flow" method (see paragraph [0045] of applicant's specification). This limitation will be further addressed in the below rejection.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 2, 4, 8, 9, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Go (USPN 6,477,279 B2) in view of Iu et al. (USPN 6,628,715).

With regard to claim 8, which is representative of claim 1, Go discloses generating a single channel image for each of two input images according to a function that measures, for each pixel, occurrence of a desired characteristic, other than luminance alone, in the input images at each pixel location to provide a value for an output pixel in the single channel image from a range of values that represent a likelihood of the occurrence of the desired characteristic. (Go col. 7, lines 4-32 in conjunction with Fig. 13: The reference describes generating a pair of edge images, Sv and Sh (i.e. single channel images) from input images X₀ and X₁, using edge detectors 21-1 and 21-2. The edge detectors detect variations of the rate of change of pixel values from pixel to pixel in the input images using the functions described at lines 15 and 20 of column 7 (i.e. a function that measures, for each pixel, occurrence of a desired characteristic, other than luminance alone, in the input images at each pixel). The desired characteristic is the edge sharpness at each pixel also referred to as the edge size. These values provide a value for the output pixel in Sv and Sh (i.e. single channel images) and have a range of values that represent a likelihood of occurrence of the desired characteristics (i.e. the range of Sh and Sv is the likelihood of the occurrence of an edge, or the 'edge strength')).

Go further discloses computing an estimate of motion of the desired characteristic between the two images using a gradient based method using the single channel images generated for the two input images (see Fig. 13 and column 17, lines 6-19: The reference describes a motion estimator that uses the generated edge images Sh and Sv

Art Unit: 2621

(i.e. using the single channel images generated for the two input images) to compute edge motion vectors (i.e. an estimate of motion of the desired characteristic between the two images).).

Go fails to expressly disclose that the computation of the motion of the desired characteristic between the two images uses, as a constraint, that a total of the desired characteristics is constant from one image to a next image. Iu, however, explicitly discloses this limitation (Iu col. 2 lines 16-39). Iu discloses a “motion constraint equation” which is using the constraint that the image gradient (i.e. the ‘edge strength’ value, which is the desired characteristic between the two images) is constant from one image to next.

It would have been obvious to one reasonably skilled in the art at the time of the invention to modify Go’s method of image motion analysis by using a constraint that a total of the desired characteristic is constant from one image to the next as taught by Iu. Such a modification would have allowed for a high performance method that was easy to implement (Iu col. 2 lines 35-36).

With regard to claim 9, which is representative of claim 2, Go discloses that the desired characteristic is edge magnitude (Go column 7, lines 29-32: The reference describes that the desired characteristic is the edge sharpness at each pixel also referred to as the edge size.).

With regard to claim 11, which is representative of claim 4, Go discloses processing the input images according to the estimate of motion (Go column 17, lines 30-33: The reference describes that a multiplexer multiplexes the edge difference information and the motion information to obtain an encoded image. The edge difference information is obtained from the input images, therefore a processed version of the input images (i.e. the edge difference information) is further processed according to the motion information to obtain an encoded image.).

5. Claims 3, 10, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Go and Iu as applied to claims 1, 4, 8, and 11 above, and further in view of Kobilansky (U.S. Patent Application Publication No: US 2002/0159749 A1). The arguments as to the relevance of Go and Iu as applied above are incorporated herein.

Claim 3 calls for the desired characteristic to be proximity to a color. The use a motion estimator based on the proximity to a color is absent from the combination of Go and Iu. However, Kobilansky, in the same field of endeavor of image processing and the same problem solving area of motion estimation, discloses a motion estimation technique that takes into account the proximity to a color (see paragraph [0015]: The reference describes that a region in the target frame should have a color close (i.e. proximity to a color) to the same region in the reference frame.).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the combination of Go and Iu by having the desired characteristic as proximity to a color as taught in Kobilansky because the use of such a desired characteristic “provides enhancements to the process of estimating motion in image-sequences such as those that originate from motion pictures or television video” (see Kobilansky: paragraph [0004]).

Art Unit: 2621

As applied to claims 10 and 14, which merely call for an apparatus for performing the method of claim 3, the combination of Go, Iu, and Kobilansky disclose such an apparatus as can be seen in Fig. 13 of Go.

6. Claims 5 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Go and Iu as applied to claims 4 and 11 above, and further in view of Von Brandt (USPN 4,924,310). The arguments as to the relevance of Go and Iu as applied above are incorporated herein.

With regard to claim 12 which is representative of claim 5, the combination of Go and Iu fails to expressly disclose using the motion estimate to interpolate between two images. Von Brandt, however, discloses using a motion estimate to interpolate between two images (Von Brandt col. 1 lines 40-54). It would have been obvious to one reasonably skilled in the art at the time of the invention to modify the combination of Go and Iu's motion estimation method by using the estimate to interpolate between two images as taught by Von Brandt. Such a modification would have allowed for the reconstruction of missing image frames (Von Brandt col. 1 lines 40-42).

With regard to claim 13, which is representative of claim 6, Go discloses that the desired characteristic is edge magnitude (Go column 7, lines 29-32: The reference describes that the desired characteristic is the edge sharpness at each pixel also referred to as the edge size.).

7. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Go, Iu, and Von Brandt as applied to claim 5 above, and further in view of Kobilansky (U.S. Pat. Pub. No. US2002/0159749 A1). The arguments as to the relevance of the combination as applied above are incorporated herein.

Kobilansky, in the same field of endeavor of image processing and the same problem solving area of motion estimation, discloses a motion estimation technique that takes into account the proximity to a color (see paragraph [0015]: The reference describes that a region in the target frame should have a color close (i.e. proximity to a color) to the same region in the reference frame.).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the combination of Go, Iu, and Von Brandt by having the desired characteristic as proximity to a color as taught in Kobilansky because the use of such a desired characteristic "provides enhancements to the process of estimating motion in image-sequences such as those that originate from motion pictures or television video" (see Kobilansky: paragraph [0004]).

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

Art Unit: 2621

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patrick L Edwards whose telephone number is (703) 305-6301. The examiner can normally be reached on 8:30am - 5:00pm M-F.

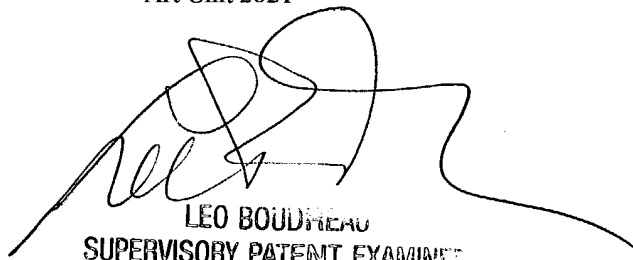
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo Boudreau can be reached on (703) 305-4706. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Patrick L Edwards

Art Unit 2621

ple



LEO BOUDREAU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER